TECHNICAL REVIEW DOCUMENT FOR OPERATING PERMIT 96OPBO174

to be issued to:

University of Colorado at Boulder, Williams Village Boulder County Source ID 0130019

Prepared by Doris Jung on July 29, 1998 Revised by Vincent Brindley on October 7, 1998

I. Purpose

This document will establish the basis for decisions made regarding the Applicable Requirements, Emission Factors, Monitoring Plan and Compliance Status of Emission Units covered within the Operating Permit proposed for this site. It is designed for reference during review of the proposed permit by the EPA and during Public Comment. The conclusions made in this report are based on information provided in the original application submittal of February 9, 1996, additional information submitted July 28, 1998, and a review of APCD files. This narrative is intended only as an adjunct for the reviewer and has no legal standing.

II. Source Description

The University of Colorado (CU) at Boulder consists of a Power House, a service building, a heating plant for a dormitory known as Williams Village, and miscellaneous insignificant activities around campus. CU requested separate Operating Permits for the Power House and the heating plant for Williams Village. The service building is classified as an insignificant source of emissions. The heating plant at Williams Village generates steam for use in heating and air conditioning using two water tube boilers. The boilers have the capability to fire either natural gas or No. 2 fuel oil and share a common exhaust stack.

The facility is located at 600 30th Street in Boulder, Colorado. The area in which the plant operates is designated as nonattainment for carbon monoxide (CO), particulate matter less than 10 μ m (PM $_{10}$) and ozone. There are no affected states within 50 miles of the plant. The Federal Class I designated areas within 100 kilometers of the plant are Rocky Mountain National Park, Rawah Wilderness Area, and Eagle's Nest.

Facility wide emissions for pollutants of concern, Nitrogen Oxides (NO_x), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Sulfur Dioxide (SO₂), Particulate Matter (PM), Particulate Matter less than 10 microns (PM₁₀), and Hazardous Air Pollutants (HAPs) are as follows:

<u>Pollutant</u>	Potential Emissions ¹ (tpy)	Potential Emissions ² (tpy)	Actual Emissions (tpy)
$\overline{NO_{x}}$	33.1	46.8	4.13
CO	27.8	11.7	1.03
VOC	1.82	4.68	0.08
SO_2	0.20	505.5	0.06
PM	2.51	4.68	0.40
PM_{10}	2.51	2.34	0.40
HAPs	0.62	Negligible	Negligible

¹Boilers B001 and B002 burning natural gas at 1000 Btu/scf

Facility wide potential emissions and actual emissions are based on data submitted with the Title V application and Air Pollution Emission Notices (APENs) on file with the Division. This facility along with the Power House on the main campus are considered a single source for NSR purposes. Potential emissions and actual emissions for the Power House and the heating plant at Williams Village are as follows:

<u>Pollutant</u>	Potential Emissions (tpy)	Actual Emissions (tpy)
NO_x	296.8	120.13
CO	117.8	19.10
VOC	67.3	0.11
SO_2	562.2	0.64
PM	28.9	0.45
PM_{10}	26.7	0.44
HAPs	0.62	0.62

The source is located in an area currently designated as nonattainment for PM $_{10}$, CO and ozone. Therefore, the source is considered a major source of CO, NO $_{x}$ and SO $_{2}$ (PTE greater than 100 tpy) and are subject to NSR review for those pollutants. NO $_{x}$ and SO $_{2}$ are considered pre-cursors to PM $_{10}$; therefore, NO $_{x}$ and SO $_{2}$ are subject to major nonattainment area NSR review. NO $_{x}$ and SO $_{2}$ are also subject to PSD review; however, since the major nonattainment area NSR threshold (100 tpy) and requirements (LAER) are more stringent than the PSD threshold (250 tpy) and requirements (BACT), any major modifications would be processed using the major nonattainment area NSR procedures. Therefore, future modifications to the source, either this facility, the Power House or a new facility, which are in excess of significance levels defined in Colorado Regulation No. 3, Part A, Section I.B.58 shall result in the application of NSR review requirements.

This facility currently has no applicable MACTs and indicated that they are not subject to the provisions of 112(r). In their Title V application, the source certified compliance with all current applicable requirements.

²Boilers B001 and B002 burning No. 2 Fuel Oil (at 144,000 Btu/gal and 0.39% sulfur)

III. Emission Sources

The following sources are specifically regulated under terms and conditions of the Operating Permit for this Site:

Units B001 and B002 - Babcock and Wilcox Boilers, Models FM-1278 and FM-1835, S/N: Natl. Board 22030 Co. State 15577 and Natl. Board 23144 Co. State 18651, 37.5 MMBtu/hr and 39.5 MMBtu/hr, Natural Gas or No. 2 Fuel Oil.

SCENARIO I - NATURAL GAS FIRED

1. Applicable Requirements

Units B001 and B002 were installed and began operation in 1965 and 1969, respectively. These units have not been modified since installation and are therefore grandfathered from Colorado Construction Permitting requirements per Regulation No. 3, Part B.I.A. Consequently, the only applicable requirements for these boilers are the following:

• Maximum Allowable Particulate Emissions Standard for fuel burning equipment (Regulation No. 1, Section III.A.1.b)

 $PE = 0.5(FI)^{-0.26}$

Where: PE = Allowable Particulate emissions (lb/MMBtu)

FI = Fuel Input (MMBtu/hr)

- 20% Opacity limitation during normal operations (Regulation No. 1, Section II.A.1)
- APEN Reporting (Regulation No. 3, Part A, Section II)

2. Emission Factors

Emissions from these boilers are produced during the combustion process, and are dependent upon the specific properties of the natural gas being burned. The pollutants of concern are NO_x , CO, VOC, SO_2 , PM, and PM_{10} . The AP-42 (EPA Compilation of Air Pollutant Emission Factors, March 1998) emission factors for small boilers from Tables 1.4-1 and 2 are based on a heating value of 1020 Btu/scf. The factors below are adjusted to a heating value of 1000 Btu/scf.

	AP-42 Emission Factor based
<u>Pollutant</u>	on 1000 Btu/scf (lb/MMscf)
NO _x	98
CO	82
VOC	5.4

SO ₂	0.6
PM	7.5
PM_{10}	7.5

3. Monitoring Plan

CU shall calculate emissions for fee purposes based on fuel consumption and the fuel based emission factors listed above. They will be required to conduct emissions calculations on an annual basis and submit an annual report with the compliance certification.

The Opacity standard of 20% will be demonstrated by the use of natural gas. Inspectors may verify this with EPA Method 9 opacity readings if necessary.

The Maximum Allowable Particulate Emissions Standard (Regulation No. 1, Section III.A.1.b) for these boilers are calculated below.

B001:
$$\mathbb{E} = 0.5(3^{\circ}.5)^{-0.25} = 0.99 \frac{b \mathbb{R}^{1}}{1000}$$

B002:
$$\mathbb{E} = 0.5(39.5)^{-0.25} = 0.99 \frac{b \mathbb{R}^{1}}{1000}$$

Since the AP-42 PM emission factor is 7.5 lb PM/MMscf or 0.0075 lb PM/MMBtu at a natural gas heating value of 1000 Btu/scf, compliance with the Particulate Emissions Standard may be ensured by burning natural gas.

A revised APEN must be submitted to the Division as required by Regulation No. 3, Part A, Section II.C.

4. Compliance Status

Current APENs reporting criteria emissions are on file with the Division for these boilers. These sources are grandfathered from Colorado Construction Permitting requirements. No records indicating non-compliance were found in a review of the facility's APCD files. Therefore, these units are considered to be in compliance with all current applicable requirements.

SCENARIO II - BACKUP No. 2 FUEL OIL FIRED

1. Applicable Requirements

Units B001 and B002 were installed and began operation in 1965 and 1969,

respectively. These units have not been modified since installation and are therefore grandfathered from Colorado Construction Permitting requirements per Regulation No. 3, Part B.I.A. Consequently, the only applicable requirements for these boilers are as follows:

 Maximum Allowable Particulate Emissions Standard for fuel burning equipment (Regulation No. 1, Section III.A.1.b)

$$PE = 0.5(FI)^{-0.26}$$

Where: PE = Allowable Particulate emissions (lb/MMBtu)

FI = Fuel Input (MMBtu/hr)

 Maximum Allowable Sulfur Dioxide Emissions Standard (Regulation No. 1, Section VI.A.3.b.i): 1.5 lb SO₂/MMBtu

• 20% Opacity limitation during normal operations (Regulation No. 1, Section II.A.1)

• 30% Opacity limitation during start-up, etc. (Regulation No. 1, Section II.A.4)

APEN Reporting (Regulation No. 3, Part A, Section II)

2. Emission Factors

Emissions from these boilers are produced during the combustion process, and are dependent upon the specific properties of the No. 2 fuel oil being burned. The pollutants of concern are NO_x , CO, VOC, SO_2 , PM, and PM_{10} . The AP-42 (EPA Compilation of Air Pollutant Emission Factors, October 1996) emission factors for uncontrolled fuel oil combustion industrial boilers are taken from Tables 1.3-1, 2 and 5. (S) is the weight percent of sulfur in the fuel oil. According to information provided by the source, the weight percent of sulfur in the fuel oil is 0.39% but this number may be adjusted as the source receives more fuel oil shipments.

<u>Pollutant</u>	Emission Factor (lb/1000 gal)
NO _x	20
CO	5
VOC	0.2
SO ₂	142 (S)
PM	2
PM_{10}	1

3. Monitoring Plan

CU shall calculate emissions for fee purposes based on fuel consumption and the fuel based emission factors listed above. They will be required to conduct emissions calculations on an annual basis and submit an annual report with the compliance

certification.

Opacity of emissions during normal operations shall not exceed 20% (Colorado Regulation No. 1, Section II.A.1). Compliance with this standard shall be determined by conducting emissions observations in accordance with EPA Reference Method 9. Readings shall be conducted monthly, during normal operations, when No. 2 fuel oil is burned. If applicable, the reading shall be conducted within 24 hours of completion of the opacity reading as described under Condition 2.7. Results of Method 9 readings and a copy of the certified Method 9 reader's certification shall also be kept on site and made available to the Division upon request.

Opacity of emissions during fire building, cleaning of fireboxes, soot blowing, start-up, process modifications, or adjustment of control equipment shall not exceed 30% for a period or periods aggregating more than six (6) minutes in any sixty (60) consecutive minutes (Colorado Regulation No. 1, Section II.A.4). Compliance with this standard shall be determined by conducting visual emission observations in accordance with EPA Reference Method 9. Readings shall be conducted within one hour of commencement of any of the above activities and every 24 hours thereafter during the activity.

The source shall record the sulfur content and the heating value of each fuel shipment as received or test the tank contents after each shipment is received. These values will be used to determine if burning fuel oil from each shipment received will comply with the maximum allowable SO_2 emission standard and estimate SO_2 emissions. The heating value and sulfur content provided in the permit application and used by the Division are 144,000 Btu/gal and 0.39%, respectively. With these values, the SO_2 emissions for this fuel shipment from combustion were determined as 0.38 lb SO_2 /MMBtu (see equation below), which is less than the maximum allowable SO_2 emission standard of 1.5 lb SO_2 /MMBtu. The maximum allowable SO_2 emission standard limits the maximum sulfur content to 1.52% in No. 2 fuel oil (at a heating value of 144,000 Btu/gal).

$$\frac{b \cdot \$D_2}{\text{MBB}_1} = \frac{\$2 \cdot (0.39) \cdot b \cdot \$D_2}{\$0} \times \frac{g_1}{\text{MB}_2} \times \frac{g_2}{\text{MB}_2} \times \frac{10^{-6} \cdot B_2}{\text{MB}_2} = 0.38 \cdot b \cdot \frac{\$D_2}{\text{MB}_2}$$

At a design fuel input rate of 37.5 and 39.5 MMBtu/hr, the maximum allowable PM emission standard (PE) and the maximum PM emissions from No. 2 fuel oil combustion were determined (see equations below). The maximum PM emissions from combustion is 0.01 lb PM/MMBtu, which is well below the PE of 0.19 lb PM/MMBtu. As long as the fuel's heating value and the PM emission factor for external combustion of No. 2 fuel oil do not change significantly, compliance with the Particulate Emissions Standard may be ensured by burning No. 2 fuel oil.

$$\mathbb{E} = 0.5(3^{\circ}.5)^{-0.25} = 0.9 \quad \frac{b \, \mathbb{R}^{1}}{\text{NMB}}$$

$$\mathbb{E} = 0.5(3^{\circ}.5)^{-0.25} = 0.9 \quad \frac{b \, \mathbb{R}^{1}}{\text{NMB}}$$

$$\frac{b \, \mathbb{R}^{1}}{\text{NMB}} = \frac{2 \, b \, \mathbb{R}^{1}}{\text{COD}} \, x \, \frac{d}{14 \, \text{NOD}} \, x \, \frac{10^{\circ} \, \text{Bb}}{\text{NMB}} \, x \, \frac{0^{\circ} \, \text{Bb}}{\text{NMB}} = 0.0 \quad \frac{b \, \mathbb{R}^{1}}{\text{NMB}}$$

A revised APEN must be submitted to the Division as required by Regulation No. 3, Part A, Section II.C.

4. Compliance Status

Current APENs reporting criteria emissions are on file with the Division for these boilers. These sources are grandfathered from Colorado Construction Permitting requirements. No records indicating non-compliance were found in a review of the facility's APCD files. Therefore, these units are considered to be in compliance with all current applicable requirements.

IV. Insignificant Activities

The following are identified by the source as insignificant activities:

- No. 2 Fuel Oil Storage Tanks, 2-24,000 gal.
- Landscaping and site housekeeping devices equal to or less than 10 hp in size
- Chemical Storage tanks or containers that hold less than 500 gallons, and which have a daily throughput less than 25 gallons

V. Alternative Operating Scenarios

The only requested alternative scenario was described in the section for Units B001 and B002 Scenario 2 (back-up No. 2 fuel oil use).

VI. Permit Shield

No specific regulations were cited by CU as non-applicable to this source.